

NEW RECORDS OF PYRENOCARPOUS LICHENS FROM AUSTRALIA

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ABSTRACT

McCarthy, P.M. New records of pyrenocarpous lichens from Australia. *Muelleria* 8(1): 31–36 (1993). — *Laurera madreporiformis* (Eschw.) Riddle, *Pyrenula macularis* (Zahlbr.) R. C. Harris, *P. rubrostoma* R. C. Harris, *Staurothele fissa* (Taylor) Zwackh, *Strigula stigmatella* (Ach.) R. C. Harris and *Thelenella marginata* (Groenh.) Mayrh. are reported from Australia for the first time. New state/territorial records are provided for six other species.

INTRODUCTION

Whereas the Verrucariaceae and, to a lesser degree, Trichotheliaceae dominate the pyrenocarpous lichen flora of southern Australia, in tropical and subtropical latitudes, as elsewhere in the world, the Pyrenulaceae, Trichotheliaceae and Trypetheliaceae appear to be pre-eminent. However, almost all of the descriptions and reports from northern Australia are based solely on nineteenth century collections of often doubtful or poorly circumscribed entities. The present contribution documents several, mostly recent collections of Pyrenulaceae, Strigulaceae, Thelenellaceae, Trichotheliaceae, Trypetheliaceae and Verrucariaceae, mainly from northern New South Wales, Queensland and the Northern Territory.

THE SPECIES

1. *Clathroporina exocha* (Nyl.) Müll. Arg., *Bull. Herb. Boissier* 2, App. 1: 93 (1894). — *Verrucaria exocha* Nyl., *Flora* 52: 125 (1869).

Thallus corticolous, crustose, forming large, peeling, glossy, yellowish green patches. *Perithecia* immersed in inconspicuous, 0.5–1 mm diam., thalline verruciae; involucrellum vestigial; ostiole depressed. *Ascospores* 8 per ascus, muriform, colourless, fusiform-ellipsoid to fusiform, 60–100 × 20–30 µm, with a thick gelatinous sheath.

Apparently confined to the south-eastern Pacific rim, and already known from Queensland, *C. exocha* is reported for the first time from New South Wales.

SPECIMEN EXAMINED

New South Wales — Central Coast, 17 km SSE of Forster, Wallingat State Forest, Sugar Creek Flora Reserve, alt. c. 60 m, on bark in rainforest, 24 Apr. 1990, P.M. McCarthy (MEL).

2. *Laurera madreporiformis* (Eschw.) Riddle, in Howe, *Torreya* 16: 50 (1916). — *Trypethelium madreporiforme* Eschw., *Syst. Lich.*: 24 (1824).

Thallus crustose, corticolous, epiphloeodal, continuous, pale yellowish grey. *Perithecia* simple, 0.4–0.65 mm diam., solitary or in groups of up to 20 in rounded or irregular, dark olive-brown to black pseudostromata that contain orange, K+ purple-red crystals. *Ostiole* brown, in a plane, epruinose apical depression, 0.11–0.22 mm wide. *Centrum* 0.3–0.47 mm diam., interspersed with minute granular bodies. *Excipulum* brown-black, 40–60 µm thick near the apex, 17–22 µm thick at the base. *Pseudoparaphyses* branched-anastomosing, 1–1.5 µm thick. *Asci* 8-spored, clavate to clavate-cylindrical, 130–175 × 27–41 µm. *Ascospores* colourless, muriform-euseptate, with 10–15 transverse and 3–4 longitudinal divisions, ellipsoid to elongate-ellipsoid, 35–55 × 11–18 µm.

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Laurera madreporiformis is known in the Neotropics (Letrouit-Galinou 1957, Harris 1986) and India (Awasthi 1991). Its inclusion in recent Australian checklists (Filson 1983, 1986, 1988, McCarthy 1991) is most probably erroneous. It was not listed the earlier inventory of Weber & Wetmore (1972), nor have I been able to find any reports in the literature. The name *L. madreporiformis* var. *obscurior* (Church. Bab.) Zahlbr., which has appeared in all recent checklists, has, in fact, never been collected in Australia. Moreover, that taxon is not a *Laurera* but a bark-inhabiting fungus that is known only from New Zealand (Galloway 1985).

SPECIMENS EXAMINED

Northern Territory — Manton Dam, 51 km SE of Darwin, 12°50'S, 131°08'E, alt. 70 m, on fallen tree-branch, in forest beside stream below dam, 26 Dec. 1984, *H. Streimann 8743* (CBG 9011111); Wangi Road, Walker Creek, 68 km SSW of Darwin, 13°05'S, 130°43'E, alt. 95 m, on shrub-branch in *Eucalyptus* woodland on moderate slope, 1 Jan. 1985, *H. Streimann 8801* (CBG 9011112, part).

3. *Pyrenula astroidea* (Fée) R. C. Harris, *Mem. New York Bot. Gard.* 49: 87 (1989). — *Parmentaria astroidea* Fée, *Essai Crypt.*: 70 (1824).

Thallus epiphloedal, corticate, smooth, pale grey-green to grey-brown, UV-. *Perithecia* 0.4–0.8 mm diam., fused at the ostiole in groups of 2–5 and enclosed in a black, semi-immersed, 1–1.8 mm diam. pseudostromatic shell. *Ascospores* pale brown, submuriform-distoseptate, elongate-ellipsoid, 29–38 × 12–17 µm.

It has been suggested by Harris (1989) that this comparatively well-known lichen is probably pantropical in dry lowland regions. Its known Australian distribution, previously limited to south-eastern Queensland, is expanded here to include eastern and north-eastern New South Wales.

SPECIMENS EXAMINED

New South Wales — SE of Armidale, River Styx State Forest, Big Hill, between Jeogla and Georges Creek, on bark in wet sclerophyll forest, 25 Oct. 1967, *W. A. Weber & D. McVean* (CBG 9011113); Blue Mountains, Mount Wilson, below Gwynne Rocks look-out, on *Atherosperma moschatum* in residual rainforest, 3 Apr. 1968, *W. A. Weber* (COLO L-47364, CBG 9200943).

4. *Pyrenula macularis* (Zahlbr.) R. C. Harris, *Mem. New York Bot. Gard.* 49: 94 (1989). — *Anthracotheceum maculare* Zahlbr., *Mycologia* 22: 70 (1930).

Thallus pale yellowish green, white-maculate, smooth, continuous, UV-. *Perithecia* very numerous, almost entirely immersed, 0.28–0.42 mm diam. *Ascospores* uniseriate in elongate-cylindrical asci, ellipsoid to elongate-ellipsoid, muriform, with 6–8 rows of 3–6 rounded locules, 35–46.5 × 14.5–18 µm.

While in most *Pyrenulae*, post-mature ascospores darken and shrivel, in *P. macularis* and a few others they retain their shape; however, the locules lose definition and are replaced by globules of a dark red-brown oily substance. This lichen is known from Central America, the Caribbean region, Africa and Madagascar (Harris 1989).

SPECIMEN EXAMINED

Northern Territory — Lee Point, 16 km NNE of Darwin, 12°20'S, 130°54'E, on treelet stem in low coastal scrub, alt. 3 m, 2 Jan. 1985, *H. Streimann 8825* (CBG 9007586).

5. *Pyrenula ochraceoflava* (Nyl.) R. C. Harris, *Mem. New York Bot. Gard.* 49: 96 (1989). — *Verrucaria ochraceoflava* Nyl., *Expos. syn. Pyren.*: 50 (1858). — *Anthracotheceum ochrotropum* (Nyl.) Zahlbr., *Cat. lich. univ.* 1: 468 (1922).

Thallus crustose, effuse, yellowish-white, K+ purple. *Perithecia* 0.24–0.4 mm diam., partly overgrown by the thallus. *Ascospores* biseriata in the asci, submuriform-distoseptate, colourless to pale brown, 11–19 × 8.5–12 µm.

This pantropical and most distinctive lichen, already known (as *Anthracotheicum ochrotropum*) from Queensland (McCarthy 1991), is reported for the first time from the Northern Territory.

SPECIMENS EXAMINED

Northern Territory — Grant Is., fresh-water billabong, behind beach, on bark in *Rhizophora-Melaleuca* complex, 9 Jul. 1975, *D. Grace* (MEL); Arnhem Land, King. R., 24 km upstream from Maningrida, on bark, 2 Aug. 1975, *D. Grace* (MEL).

6. *Pyrenula ravenelii* (Tuck.) R. C. Harris, *Mem. New York Bot. Gard.* 49: 99 (1989). — *Parmentaria ravenelii* (Tuck.) Müll. Arg., *Flora* 68: 250 (1885).

Pyrenula ravenelii may be distinguished from the closely related *P. astroidea* mainly by its larger, muriform-distoseptate ascospores (Harris 1989). First described and most commonly known from the south-eastern United States (Harris 1989), *P. ravenelii* (as *Parmentaria ravenelii*) was reported from Warburton, Victoria by Müller (1893). The Tasmanian specimen listed here has ascospores of $61\text{--}80 \times 21\text{--}30 \mu\text{m}$ and was formerly attributed to the quite different tropical lichen *Parmentaria gregalis* (Knight) Müll. Arg. (McCarthy 1991).

SPECIMEN EXAMINED

Tasmania — Hobart Rivulet, on bark, Jan. 1901, *F.R.M. Wilson* (MEL 5819).

7. *Pyrenula rubrostoma* R. C. Harris, in Tucker & Harris, *Bryologist* 83: 16 (1980).

Thallus thin, smooth, corticate, greyish brown. *Perithecia* semi-immersed, conical, 0.46–0.66 mm diam., with a spreading and uniformly brown-black involucrellum, K–. *Ascospores* 4-celled, pale brown, elongate-ellipsoid, irregularly biseriolate in the asci, with an additional endospore layer around the lumina, $16\text{--}23.5 \times 7.5\text{--}12.5 \mu\text{m}$.

Harris (1989, in Tucker & Harris 1980) observed that *P. rubrostoma* possesses two especially distinctive characters, viz. a bright red, K+ blue ostiolar area and a second endospore layer within the $17\text{--}19 \times 7.5\text{--}9 \mu\text{m}$ ascospores. However, he also noted an absence of red pigment in some specimens, in which case 'the spores are sufficient for determination' (Tucker & Harris 1980).

This is the first Australian record of a lichen previously known only from the southern American states of Louisiana and Florida.

SPECIMEN EXAMINED

Queensland — 5 miles W of Gordonvale, on bark in lowland rainforest, 17 Apr. 1968, *W. A. Weber* (COLO L-48205).

8. *Staurothele fissa* (Taylor) Zwackh, *Flora* 45: 552 (1862). — *Verrucaria fissa* Taylor, *Fl. hibern.* 2: 95 (1836).

Thallus crustose, epilithic, rimose to areolate, dark olive brown to brown-black, 80–140 μm thick. *Perithecia* 0.24–0.38 mm diam., semi-immersed to almost entirely immersed in prominent thalline verrucae. *Hymenial algae* globose-cuboid. *Ascospores* 2 per ascus, muriform-euseptate, hyaline to pale brown, $32\text{--}50 \times 14\text{--}20 \mu\text{m}$.

Staurothele fissa is a rather common lichen on aquatic and semi-aquatic siliceous rocks in cool-temperate, alpine and boreal regions of the Northern Hemisphere (Clauzade & Roux 1985, Kopachevskaya *et al.* 1977, Thomson 1991); it has also been found in New Zealand (Galloway 1985). Although *Staurothele* has not been reported from Australia, fragmentary specimens of an indeterminate calcicolous species are known from Kalbarri National Park in Western Australia (specimens in MEL).

The Tasmanian specimens of *S. fissa* were found on exposed surfaces, between 10 and 50 cm above water-level, together with *Hymenelia lacustris*, *Ver-*

rucaria aff. *praetermissa* and *Verrucaria* aff. *submargacea*. In view of its distribution in the Northern Hemisphere, it is, I believe, noteworthy that this lichen was not seen in any of the 40–50 creeks visited by me in central and eastern Victoria and coastal New South Wales.

SPECIMEN EXAMINED

Tasmania — Tyenna R., c. 2 km E of Westerway, by Hobart-Maydena road, semi-aquatic on large dolerite boulders, 26 Apr. 1992, P. M. McCarthy (MEL, HO).

9. *Strigula stigmatella* (Ach.) R.C. Harris, in Hawksworth *et al.*, *Lichenologist* 12: 107 (1980). — *Porina faginea* (Schaerer) Arnold, *Flora* 68: 166 (1885).

Thallus crustose, subepilithic to epilithic, pale greenish grey, smooth, glossy, continuous to sparingly rimose, 15–30(–80) μm thick. *Perithecia* 1/3-immersed to semi-immersed. *Perithecial apex* flattened. *Ostiole* pale brown. *Involucrellum* (0.34–)0.47(–0.64) mm diam., penetrating to excipulum-base level, uniformly dull olive-black in thin section or with only the outermost 25–30 μm olive-black and the inner parts pale to medium brown and interspersed with algal cells, 60–90 μm thick. *Excipulum* colourless at the base, colourless to brown at the sides, dark brown towards the apex. *Paraphyses* simple to very sparingly branched, not anastomosing. *Asci* fissitunicate, 90–110 \times 13–16 μm ; ocular chamber becoming tuberculate, c. 3 \times 1 μm . *Ascospores* colourless, 7-septate, fusiform, 23–33 \times 5.5–7.5 μm . *Conidiomata* of two types; 1) 100–160 μm diam., dark brown above, colourless below, with 5–7-septate, 15–21 \times 3–4.5 μm bacilliform macroconidia growing vertically from the apices of short, unbranched conidiophores; 2) 60–80(–100) μm diam., with straight, 2–3 \times 0.7 μm microconidia.

Until comparatively recently, *Strigula* was considered to be exclusively foliicolous (Santesson 1952). However, once the possession of a subcuticular thallus, an important generic characteristic of the foliicolous taxa (though of little meaning when applied to species on other substrata) was set aside, a number of hitherto problematical corticolous and bryophilous pyrenocarps were referable to *Strigula* (Harris 1975). Five obligately and facultatively saxicolous taxa are currently known from Europe and the Americas.

Strigula stigmatella is almost exclusively corticolous and bryophilous. It has been reported from northern, central and eastern Europe and from northern U.S.A. Apart from the Australian collections described here, I have seen only one other saxicolous specimen [Germany, Oberbayern, bei Tolz, an umherliegenden Sandsteinen im Walde an der Westseite des Blombergs, 19 Sep. 1880, F.C.G. Arnold 863 (G)].

SPECIMENS EXAMINED

New South Wales — Newcastle region, 3 km SE of Stroud Road, 1 km S of Stroud Mt, creek beside Ducks Hill Road, on deeply shaded semi-aquatic rhyolite, 22 Apr. 1990, P.M. McCarthy 363 (MEL 1055381); Chichester State Forest, 19 km W of Stratford, Karuah Valley Road, off Wards River-Berrico Trig Road, Karuah R., on shaded semi-aquatic slate, 9 Feb. 1991, P.M. McCarthy 519 (MEL 1055306).

10. *Thelella marginata* (Groenh.) Mayrh., *Bibliotheca lichenol.* 26: 48 (1987). — *Microglæna marginata* Groenh., *Reinwardtia* 2: 391 (1954).

Thallus determinate, pale yellowish green, rimose to areolate. *Perithecia* immersed in hemispherical, 0.26–0.4 mm diam. thalline verrucae. *Ascospores* hyaline, 6–8 per ascus, muriform, with 10–14 transverse and 3–4 longitudinal divisions, 30–43.5 \times 12–18 μm .

This is the second report of a lichen that was previously known from eastern Java (Mayrhofer 1987).

SPECIMEN EXAMINED

Northern Territory — Mt Brockman complex, 15 km SSE of Jabiru airfield, 12°48'S, 132°56', alt. 230 m, on shaded sandstone rock face, in *Allosyncarpia*-dominated vegetation amongst deeply dissected outcrops, 20 Apr. 1989, H. Streimann 44283 (B 79664, CBG 8914774).

11. *Trypethelium eluteriae* Sprengel, *Anleitung Kenntn. Gewachse* 3: 351 (1804).

Thallus continuous to rimose, smooth to uneven, pale brown. *Pseudostromata* containing 5–15 ascomata embedded in a powdery orange material, 0.8–2 mm wide. *Hamathecium* of branched-anastomosing pseudoparaphyses. *Ascospores* colourless, elongate-fusiform, 9–13-septate, $34\text{--}48 \times 8\text{--}11 \mu\text{m}$.

A common lowland pantropical species, *T. eluteriae* is known from the Caribbean region, South America, India and Sri Lanka, China and Australia (Queensland). The following is the first report from the Northern Territory.

SPECIMEN EXAMINED

Northern Territory — Wangi Road, Walker Creek, 68 km SSW of Darwin, 13°05'S, 130°43'E, alt. 95 m, on shrub branch in *Eucalyptus* woodland on moderate slope, 1 Jan. 1985, *H. Streimann 8801* (CBG 9011112; part).

12. *Trypethelium tropicum* (Ach.) Müll. Arg., *Bot. Jahrb.* 6: 393 (1885). — *Verrucaria tropica* Ach., *Lich. Univ.*: 278 (1810).

Thallus smooth to farinose, continuous, grey-green to yellowish grey. *Ascomata* superficial, not aggregated in pseudostromata, black, 0.4–0.55 mm diam. *Ascospores* colourless, fusiform, 3-septate, $16\text{--}27 \times 6\text{--}8 \mu\text{m}$.

Trypethelium tropicum and its many synonyms (Harris 1986) have been reported from south-eastern U.S.A., Central and South America, tropical Africa, the Indian sub-continent, Indonesia, The Philippines and Queensland. The following are the first records from the Northern Territory.

SPECIMENS EXAMINED

Northern Territory — Wangi Road, Walker Creek, 68 km SSW of Darwin, 13°05'S, 130°43'E, alt. 95 m, on shrub branch in *Eucalyptus* woodland on moderate slope, 1 Jan. 1985, *H. Streimann 8801* (CBG 9011112, part); 13 km SSE of Adelaide River township, Robin Falls, 13°21'S, 131°08'E, alt. 120 m, on bark near base of treelet, in dense vegetation on creek flats surrounded by *Eucalyptus* savannah, 14 Apr. 1989, *H. Streimann 42120* (CBG 8914609).

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